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RESEARCH PAPER

Traditional utilization of wild date palm (*Phoenix sylvestris*) in rural Bangladesh: an approach to sustainable biodiversity management

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Abstract: A study was conducted to explore the traditional utilization pattern and indigenous management practices of wild date palm (*Phoenix sylvestris* Roxb) in the rural agrarian regions of Bangladesh. A multistage sampling method with 10% intensity and a semi-structured questionnaire were used for the study. The farmers manage the palm mainly for sap production with which sugar based secondary goods are manufactured. The sap is either used fresh as drink or after some sort of processing as molasses and/or alcoholic beverage. Seven diversified sites support the palm as its habitat and most palms (20.40%) occur in orchards. Besides growing naturally, the palm is also established in orchards using the wildings as the staple planting material. Although the medium category farmers own most of the palms (33%), a considerable portion (28.68%) of it is managed by the landless farmers, who earn a substantial livelihood from the palms. The farmers practice their own indigenous wisdom in every stage of the palm's maintenance from planting through tapping for sap collection to the processing of products. If managed more scientifically on a sustainable basis with the collaboration of farmers' indigenous knowledge, this familiar palm could be able to support the rural economy of the country to a great extent. Side by side, it would also be able to contribute to the richness of biodiversity in the region.

Keywords: Bangladesh; indigenous knowledge; molasses; *Khejur* palm; sap; tapping

Introduction

The palm family (Palmae, or more recently Arecaceae), with some 2 200 species, is distributed throughout the tropics and subtropics (Johnson 1996); representing an integral and important part of tropical forests (Johnson 1995). Situated in the tropical region, Bangladesh also houses a number of palms distributing from hilly topography through plain lands to the muddy mangrove forests. Among the palms ever found in Bangladesh, the wild date palm (*Phoenix sylvestris* Roxb), locally known as *Khejur*, is one of the most common popular palms and a well-known source of sugar (Blatter 1978; Hussain 2001). It grows in a wide belt from the Atlantic Ocean through the Sahara, the Arabian Peninsula into Iran and Indus Valley in Pakistan with their main centers of production (Dowson 1982). It has long been one of the most important plants in arid, desert areas of northern Africa, the Middle East and Southern Asia (Hodel and Pittenger 2003), providing food, ornament, material for shelter, fiber and fuel in a harsh environment where relatively few other plants are able to grow (Zaid 1999). Even it does not require sun to flourish as it has the great capability of thriving under shade (Anon 2007). Such versatility has given it an endurance to resist the negative influences which affect its economic development (FAO 2007).

Palm is one of the important horticultural crops in many countries (James 1980 cited in Hussain 2001). In Bangladesh, *Khejur* palm is produced as a homestead crop; however, it grows naturally or is cultivated in fallow lands, around homesteads, farmland boundary and even in the marginal lands along the roads and canals (Anonymous 2000). In certain parts of the southwestern region, it is cultivated in orchards by planting seedlings (Rashid 1991). In the crop fields, the palm is found on the *ails* (slightly raised embankments used as border of crop fields) and also within the fields along with other crops (Abedin and Quddus 1991). Sap from *P. sylvestris* has been used from time immemorial to produce traditional sweeteners, a mainstay of Bangalee cuisine (Ahmed 2007). Because of the extensive use of its sap in making sugar, it is of considerable importance for household economy in Bangladesh, where cultivation of the palm for tap-

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ping is an age-old practice (Kamaluddin et al. 1996). The palm can be tapped regularly and year after year for long time with a small amount of investment for maintenance (Blatter 1978). Some species of *Phoenix* are able to produce sap all the year round but *P. sylvestris* only seasonally (Annett 1913).

Dalibard (2007) enlisted 30 different palm species that were traditionally tapped in parts of tropical world. *P. sylvestris* along with all other domesticated palms provides a wide array of commercial products for human kind (Johnson 1995) and is often the main subsistence resource for the poorest people (Dalibard 2007). By tapping a sound *Khejur* palm for sap one can earn substantial amount of cash money annually (Islam and Miah 2003), which appears important for Bangladesh where about 85% people are living in the villages and depend mainly on agriculture and tree-based products (Bhuiyan 1991). Since rural household income depends mainly on agriculture, landholding sizes strongly determine household economy. Due to the meager size of the landholdings, particularly rural poor households depend on tree or other plant-based economic activities in their limited space for the subsistence living (Anon 1995). Abedin et al. (Dalibard 2007) identified various types of palm-crop associations in Bangladesh, which in the words of Islam and Miah (2003) is a strong evidence of multiple land uses to meet the growing needs for the growing people. The IUCN's Palm Action Plan enunciates guidelines for the conservation of palm biodiversity. To make it worthwhile, Johnson (1995) emphasizes on the documentation of indigenous knowledge because private growers are the source of a vast amount of valuable technical information on the growth requirements and cultivation of palms. The present study was undertaken to explore the indigenous wisdom of farmers highlighting the traditional utilization patterns of *P. sylvestris* in a palm abundant region of Bangladesh.

Materials and methods

The study site

The study was conducted in Chuadanga with an area of 1157.42 km^2, a southwestern district of Bangladesh (Fig. 1), lying at 23°49′ N latitude and 88°49′ E longitude. Chuadanga is bounded by Kustia district on the northeast, Meherpur district on the northwest, Jhenaidaha district on the south and southeast, Nadia district of West Bengal of India on the southwest. It consists of four upazillas (sub-districts), namely Chuadanga Sadar, Damurhuda, Alamdanga, and Jibannagar. Annual average maximum temperature is 37.1°C and the minimum is 11.2°C with an annual average rainfall of 1 467 mm. The region is within the Gangetic delta with a network of Mathabhanga, Bhairab, Kumar, Chitra, and Nabaganga rivers possessing a physiography of mixed highland, shallow flooded and deep flooded phases. The soil is alluvium, stream deposits, delta plain deposits and flood plain deposits. The district supports a population of 987 382 with a literacy rate of 28.7%, most of whom are peasants having a cultivable land per head 0.11 ha (Ahmed 2004).

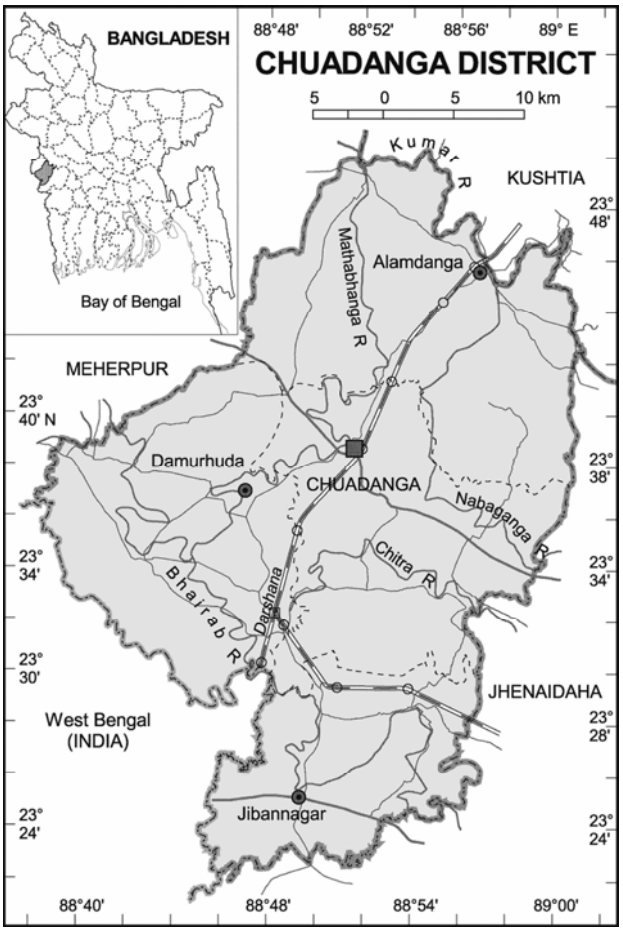

Fig. 1 Map of Chuadanga district, the study area in Bangladesh

Methods

We followed a multistage sampling method for the study. The district was chosen purposively because it is a remarkable representative site of *Khejur* palm husbandry. Among the four upazillas, Jibannagar was selected purposively because most of the *Khejur* palms of the district are concentrated there. From the upazilla, three villages producing *Khejur* palms were selected abundantly in random: one from the northeastern, one from the southwestern and the other from the middle of the upazilla. Therefore the findings represented the whole upazilla. A preliminary socio-economic survey was conducted to ascertain important socio-economic parameters of the study areas to select the respondents for detailed study. The villages were surveyed completely at that stage. The instrument used for the survey was a structured questionnaire worked out in advance and pre-tested for intelligibility. After preliminary survey, socio-economic parameters of potential value for the study were reviewed by cross-checking the land holdings, occupations, *Khejur* palm possession, land for homesteads & other operations like agriculture or fallow. Firstly the peasants involved in *Khejur* palm husbandry were enlisted and a 10% from them was selected randomly. As *Khejur* palm husbandry is the function of land holding of the households, the farmers were categorized into five groups

accordingly, *i.e*., landless, marginal, small, medium, and large, who possess less than 0.21 ha, 0.21–0.50 ha, 0.51–1.00 ha, 1.01–2.00 ha, and more than 2.00 ha of land, respectively. Then repeatedly a 10% sampling intensity was applied to select randomly the respondents from each category. The same procedure was followed for all the three villages. Ultimately a total of 36 households were selected for the study. A semi-structured questionnaire was used to collect all the relevant information by directly interviewing the farm heads of household in respective categories. However, some adjustments were done in the field to make it reasonable, clue giving and worthwhile in fact. In case of any inconvenience to understand the local terms or to realize any indigenous method, physical observation or direct demonstration of the site or object or method along with the farmers was done to make such adjustments.

Results and discussion

Habitat diversity of *Khejur* palms

During the study, we observed a total of 2 015 *Khejur* palms owned and managed by 36 households, from seven different sites (Table 1) namely canal banks, road sides, homesteads, *ails*, agricultural fields, pond banks and orchards. It was found that the highest occurrence of palms (20.40%) was represented in the orchard, followed by homestead (19.35%), pond bank (14.98%), *ail* (14.85%), agricultural field (13.74%), roadside (10.23%) and canal bank (6.45%). The similar trend was found by Kamaluddin et al. (1998) and Ahmed (1995) for Sitakund of Chittagong and north Bengal regions of Bangladesh, respectively. But it contradicts with the results found by Islam and Miah (2003) for Mirsharai of Chittagong in Bangladesh where they revealed that canal bank occupied the maximum number of palms. Most of the palms (30.48%) were found to be occupied in the study area by the age group of 14–21 years, indicating the fact that a lesser number of the palms occurred in younger group. Islam and Miah (2003) also found most of the palms (32.53%) under the age group of 7–14 years at Mirsharai of Chittagong in Bangladesh.

Table 1. Geographical and age class distribution of *Khejur* palms in the study area

Site	Age classes (Years)						
	5–7	>7–14	>14–21	>21–28	>28	Total	Percentage
Canal Bank	13	35	39	32	11	130	6.45
Road Side	12	72	59	43	20	206	10.23
Homestead	45	110	101	103	31	390	19.35
Ails	30	68	84	80	37	299	14.85
Agri-field	22	71	93	70	21	277	13.74
Pond Bank	16	76	94	86	30	302	14.98
Orchard	17	139	144	85	26	411	20.40
Total	155	571	614	499	176	2015	100
Percentage	7.69	28.33	30.48	24.77	8.73	100	--

Possession and management pattern of Khejur palms

Of the total 2 015 *Khejur* palms studied, farmers of medium category possessed 680 individuals (33%), which was the highest value among the different groups, and the landless farmers possessed only 75 individuals (4%), which was the lowest value (Fig. 2). As shown in Fig. 3, it revealed the fact that most palms were managed by the landless farmers (578 individuals, 28.68%). This is because most of the landless farmers are palm tappers and in most of the cases their main income source is *Khejur* palm tapping and sap processing, while the large category farmers managed the least palms (152 individuals, 7.54%) because of their having other potential income sources with a considerable amount of landholdings.

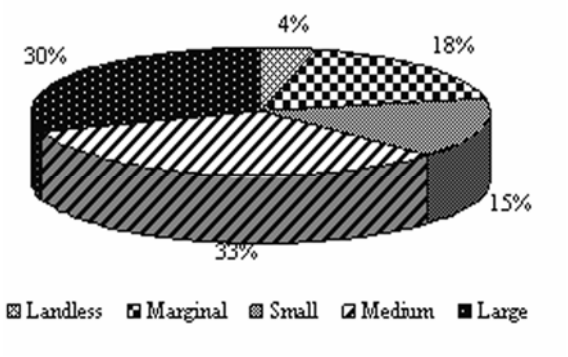

Fig. 2 *Khejur* palms owned by different household categories

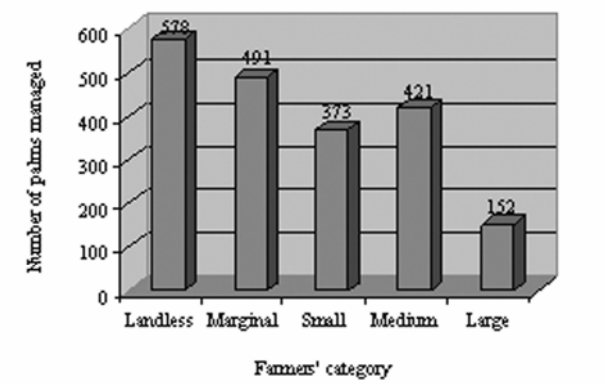

Fig. 3 *Khejur* palms managed by different household categories

Silviculture of *Khejur* palms

The study revealed that most of the palm orchards and roadside palms were developed by plantation and the rest were grown naturally, which were reported to require no scheduled maintenance and care. The farmers claimed that those would be cared by God himself and those raised in orchards were subjected to be cared and managed a bit. *Khejur* palm husbandry, in Bangladesh, is based on sporadically planted palms and/or naturally grown palms (Islam and Miah 2004). Natural regeneration occurs freely by seeds (FAO 2007) and birds act as the main agent in dispersing the seeds (Mishra and Singh 1989). The palm, however, also has the capability of vegetative propagation by the formation of offshoots (FAO 2007).

Collection of wildings

In the study area, *Khejur* palm was reported to be raised from the wildings. Such evidence was also documented by Islam and Miah (2003) where they noticed nursery raised seedlings as the other means of palm plantation in Chittagong region of Bangladesh. The palms were reported and observed to produce fruits in winter. After ripening the fruits with a huge number of seeds are found to be dispersed here and there in the vicinity of the palms. The seeds are dispersed by means of birds, squirrels, cow, goat etc., and by human who use to eat the fruits in their houses, leaving the seeds with sweepings and other household wastage. These large quantities of seeds are found to have germinated at different places during the rainy season. However, most of the seedlings are reported to be damaged particularly in the percales of land where agricultural crops are grown. The seedlings grown in the marginal or wastelands were found to usually escape from being damaged. The farmers collect mostly the naturally growing seedlings (wildings) of 1–2 years old with a height of 15–40 cm from crop fields or marginal lands by digging the earth, which the seedlings are planted immediately after collection.

Planting and maintenance of wildings

It was revealed that the farmers preferred collecting wildings from the *ail*s of agricultural land. They claimed that seedlings grown in the *ail*s are more vigorous than those grown in other places. The argument in favor of such concept may be inclined to use compost and chemical fertilizers in the agricultural fields, and also to supply nutrients to the seedlings growing adjacently. Planting was reported to be done in the rainy season in orchards with a spacing of 5′ x 5′. According to the farmers, the site must be selected carefully to avoid stagnant water. They reported that some cultural operations were required in the palm husbandry. A few farmers (27.5%) were reported to use urea fertilizer based on a belief of increasing sap productivity in the palms. Sometimes *Ula* (*Imperata cylindrica*) or some other grasses smother the seedlings. In that case, farmers were found to pay proper attention to weed for the palms. The farmers also opined that 2–4 years after planting, when ten to twelve leaves (locally called *daigo*), of 1.5 to 2 m long were seen to produce in the palms; two to four of them were cut, only leaving the 15–20 cm leaf base with the trunk. This operation was reported to usually be done before winter every year. Although the farmers are unable to provide proper argument in favor of this operation, we think that they practice it to check the transpiration in the winter season when the soil usually enjoys drought.

The farmers reported that the palms were subjected to attack by grazing animals particularly in their young stage with tender leaves. To avoid the grazing animals, 45% farmers were observed to use fences. While the others were reported to apply an indigenous technique in which they made a solution of cow dung mixed with water and sprayed the mixture on the tender leaves therefore the cattle could not browse them due to the presence of cow dung with a bad smell. An insect, locally called *Maize poka* was reported to attack the crown of the palms and to damage its central tender portion resulting in the death of the palms within a year. A very few farmers were reported to use Thiadin (an insecticide) with water at a ratio of 1:10 over the crown by spraying. The others were seen to apply a locally manufactured bio-pesticide to control the insect. They used a kind of cake made by leaves of *Nim* (*Azadirachta indica*) on the base just after making circular holes around the seedlings. Occurrence of fungal attack mainly in young palms in shady places, reported by the farmers, results even in the death of the palm within a short time.

Tapping techniques

In the study area the farmers manage *Khejur* palm mainly for the sap production with which they further manufacture some other sweet products. Such importance of the palm is also supported by FAO (2007). For India tapping of the palms is a very well developed cottage industry. Moreover, *Khejur* palm does not offer an alternative product because its fruits are not attractive for human consumption; hence it is not a choice anymore. Tapping of the palms was reported to be the prerequisite for collecting sap (Fig. 4). References to palm tapping date back long before the birth of Christ and also the famous Roman chronicler and historian Plinius makes mention of it (Darby et al. 1977). Tapping starts with a time consuming and the technique worthy preparation. The farmers opined that unskilled tappers might sometimes cause the palm to death. Literature from FAO (2007) matches with this opinion that the palm's survival depends on the skill of the tapper, because if the daily scarring is carried on too far the palm will die. Usually palms of more than five years (the same age is reported by Dalibard (2007)) are selected for tapping when woody stem attains a height of at least 60 cm. The instruments used for tapping, observed in the study area, were *dao* (a sharp iron made cutting device with larger and thinner blade), a chisel, bamboo made basket used for carrying the instruments, rope, bamboo made carrier, earthen jars etc.

Tapping operation was observed to be started at the onset of winter by a series of pruning usually 3 to 4 times. A palm having at least 60 cm woody trunk was reported to be tapped leaving 30 cm below. After six days of last pruning the palm is scratched with the *dao* and chisel during which thin scraps from the upper portion of the trunk are removed. On the 7th day, a tapping channel is cut and a bamboo made spout of 10 cm is inserted on the freshly cut trunk, another end of which is poured into the earthen jar placed and fastened just below the spout. The jar is placed at the evening on the palm leaving for the whole night and the sap-filled jar is collected very early in the next morning. The scratching of the trunk is done in every 7th day providing the palm a resting period of three days. They reported the possibility of reducing sap production, molasses quality and death of the palm if it was not given the resting period of three days. This perception reflects a nice philosophy of the farmers, which facilitates the sustainability in palm utilization. Nevertheless, in case of *Phoenix reclinata* of southeastern Africa, the tapped stems die unless tapping is stopped before the apical meristem is totally destroyed (Cunninghum 1990). Generally sap is collected from one side of the palm in one season, and from the successive

season sap must be collected from the upper opposite side of the previous cut. This was evident from the zigzag appearance of the palm stems in the study area. Farmers sometimes give 1–2 years of gap in tapping therefore the palms attain proper growth and it reflects the indigenous wisdom of the rural peasants.

Fig. 4 A farmer in tapping operation of *Khejur* palm in the study area

Sap harvesting

It was revealed that tapping of the palms for sap production started from mid October and continued to mid March of next year for approximately 152 days in the winter season. In this 152 days, palms were tapped in such a manner as (152-15)/6 = 23 times (approx.) (3 days for sap production + 3 days for resting = 6 days, where the first 15 days are required for the initial preparation of tapping). After tapping, the palms were reported to produce sap in the successive 3 days, including the day of tapping. Sap production was the maximum for the first night and decreased for the successive two nights. The study showed palms in the agricultural fields and in the *ail*s (both produce equal amount of sap), and within >7–14 years produced the highest amount of sap (7500 ml). The palms of >5–7 and >28 years were reported to produce the least amount of sap while canal bank and roadside did the same (Table 2). Although the data represents that, palms grown in the *ail*s and agricultural fields yield the same amount of sap but the farmers claim that palms grown in the *ail*s produce more sap than the others. These findings indicate that site and age of the palms do act as the important factors for sap production, and this perception is also supported by the findings of other researchers. According to Islam (2002) as well as Islam and Miah (2003), the highest amount of sap was produced by the palms of >14–21 years age category in Mirsarai Upazilla of Chittagong, Bangladesh. The farmers comment that sap produced by the palms grown on the pond and canal banks in the study area tastes sweeter and is more suitable to manufacture molasses than those from the others. This perception strongly generates the concept that site proximity of the palms to water bodies yields quality sap and interestingly these views are supported by the findings of Kamaluddin et al. (1998) as well as Islam and Miah (2003) for the same palm in two different places of Bangladesh.

Table 2. Total sap production by different aged palms on different sites in every 3 nights

Site	Production of juice/3 nights (ml)				
	Age classes (Years)				
	>5-7	>7-14	>14-21	>21-28	>28
Canal Bank	3900	6000	4950	4950	3900
Road Side	3600	5700	4800	4800	3600
Homestead	4500	6750	6000	6000	4500
*Ail*s	4500	7500	6450	6450	4500
Agricultural field	4500	7500	6450	6450	4500
Pond Bank	3900	6000	4950	4950	3900
Orchard	4200	6600	5850	5850	4200

Processing of *Khejur* sap

The sap was reported to be consumed fresh, or after being fermented, or even distilled into alcoholic beverage, or evaporated down to the viscous (*raab*) and crude sugar (molasses) in the study area. The concept of such products was also cited by Griffith (1850), Blatter (1978) and Anon (2000). Consumption of wild date palm's fresh sap and its making country liquor was also extensively seen at Bidyadharpur and Arakhapada tribal village ecosystems of Eastern Ghats of Orissa, India (Naidu and Misra 1998). In the study area, molasses is prepared by cooking palm sap up to a desired degree. Usually the tappers collect sap-filled jar, locally called *Var*, at dawn and bring it to the place of cooking by a carrier (*Bak*) made of bamboo. The farmers use a burner (*Baan*) of square shape and a tin made pan (*Tala*) with a size of 91 cm × 6 cm or 122 cm × 9 cm possessing a capacity of containing 6 km and 8 km of molasses, respectively.

The burning place was reported to either be *ex-situ* at the homestead or *in-situ* in the field. The *in-situ* procedure was observed to be maintained by males providing some facilities of not carrying the sap to homesteads and of fuel wood availability. Usually the pruned branches, dried leaves and grasses are used as fuel wood in the field. On the other hand, the *ex-situ* procedure is usually maintained by females and extra cost for fuel wood has to be then incurred. Before burning the sap is screened well to remove the dust and all other foreign matters. The *Tala* is then filled with sap and burning starts. After half an hour there produces a layer of white foam on the cooking sap which is collected by large wooden spoon (*Orong*) and cast. For a *Tala* of 91 cm × 6 cm sizes burning time is required for 2 h and for a *Tala* of 122 cm × 9 cm sizes for 2.5 h. Then, a little amount of boiled sap is taken into an earthen pot and stirred with an *Orong* with some pressure for 4–5 min to develop crystallization. The crystal is mixed immediately well with the hot boiled sap and cooked at low temperature for a few minutes and thus molasses is formed. Crystallization process is locally called "*biz tola*" which is done for the condensation of the molasses. According to the farmers there is a thumb rule that 6 L of sap produces 1 kg of molasses (A similar conversion is given in BIOPACT (2007) where an

average outturn of jaggery is 10%–15% of the weight of the raw sap). After cooling the molasses is poured in the *var*, the mouth of which is tied with polythene to make it air-tight and stored in a cooler place.

A solid molasses locally called *Patali* was observed to be manufactured by the farmers in the study area. In its preparation, crystallization of hot sap is done for a longer time usually 10–15 min. Such long duration of crystallization impels the molasses to be condensed rapidly. Then the highly crystallized molasses is mixed with the hot molasses in *Tala,* stirred well for proper mixing and then cooked for a while. Then some dices are created according to the probable shape of the *Patali* and the molasses is poured on it. In the study area the shape of the *Patali* was seen square shape. This square shape is usually formed by arranging the jute sticks one layer in the horizontal direction on the ground and the other layer on it in the vertical direction therefore a number of squares are formed. After that, a piece of cloth is placed on it in such a way that each square becomes a container. Then the hot molasses is poured on it and kept untouched for 30–45 min. Thus *Patali* is formed and is removed from the cloth and stored in a cooler and drier place.

An alcoholic beverage (locally called *Tari*) was also observed to be made by the farmers. The basic technique of manufacturing *Tari* lies in fermentation. For preparing this wine the farmers were found not to wash the *var*s for 2–3 days after removing fresh sap from it which results in the formation of whitish lees at the bottom of the vessels. Then the *var*s are filled with screened sap and kept open in the sun for about 24 h. A three-layer formation is then found inside the *var*. The topmost layer is of foam which is carefully cast away, the mid-layer possesses clear liquid which is the *Tari*, and the third one is the white layer of lees. The *Tari* from the second layer is then filtered out which is ready for drink and sale. According to the manufacturers, being of lower grade this type of *Tari* is not so hard and therefore, to make it harder, the farmers add 10 g of sago grain for each *var* and then mix it with the sap. The farmers estimated that 9 L sap is required to prepare 4 L of *Tari*, which can be stored for at best 1–2 days. The farmers claim that manufacturing of *Tari* is the most profitable business, but the legal restriction limits its production, whereas in America and Africa, tapping of palms has being practiced exclusively or mainly for wine production (Dalibard 2007).

Marketing of *Khejur* products

After collecting the sap from the palm, sometimes it was reported to be shared with the tappers. The farmers opine that while marketing the *Khejur* palm produces, sometimes sap is sold directly as drink in the local market; some sap is used for manufacturing secondary goods such as molasses, *Patali* and *Tari*. The secondary goods either are sold directly or through middlemen in the market (Fig. 5).

The highest average amount of sap (2740 L) and *Tari* (225 L) were reported to be sold by the landless farmers; molasses (1 107.5 kg) by the farmers of large category and *Patali* (253.13 kg) by the farmers of medium category to the market in a tapping season. Farmers of the medium and large categories were found neither to be involved in selling sap directly nor in manufacturing *Tari* at all.

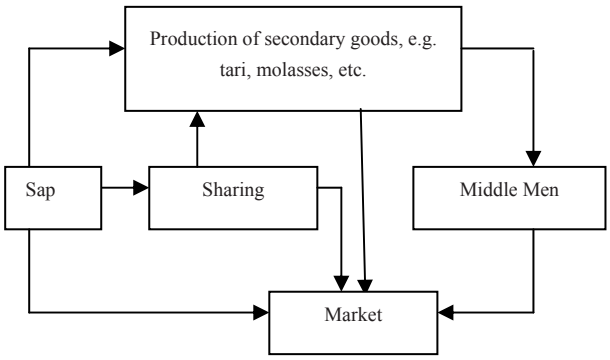

Fig. 5 Marketing channels of different *Khejur* palm products in the study area

Table 3. Average production of different *Khejur* palm goods as being sold in the market by different household categories

Household Category	Sap (Lt[a])	Molasses (kg[b])	*Patali* (kg)	*Tari* (Lt)
Landless (n=5)	2740	458.80	157.60	225
Marginal (n=10)	1588	295.90	112.50	183.30
Small (n=9)	1251.11	341.11	127.78	138.89
Medium (n=8)	---	805.50	253.13	---
Large (n=4)	---	1107.50	195	---

Note: [a] Liter, [b] Kilogram

Conclusions

Khejur palm husbandry is one of the important means of seasonal livelihoods in southwestern rural Bangladesh. It plays an active role in the contribution to rural economy, to the cultural heritage of the countrymen as well. Other than sugar production, the palm is also widely used for some other purposes as mat making, fencing, animal feed, sun-shading and soil amendment (FAO 2007). Considering these multipurpose uses, it can contribute in many ways to the sustainability of integrated farming systems. The farmers are applying solely indigenous knowledge (IK) of their own in the farming and management of this resource, exerting a sustainable manner of utilization. Over the past few decades, the importance of farmers' IK in managing natural resources has gained increasing recognition from the scientific community (Teklehaimanot et al. 2001). Conducting more researches by documentation, exploration and correlation of farmers' IK with scientific technology could easily be a tool for the improvement of the husbandry as well as conservation of this palm. *Khejur* palm products can thus contribute to the national economy on one hand and the sustainable management of the palm on the other hand can upgrade the micro-climatic condition, enriching the vegetation resources of the country. The IUCN Palm Specialist Group has already declared the Palm Action Plan with a view to conserve the palms and to explore their utilization worldwide (Johnson 1995). It might be the time for the policy makers in Bangladesh to pay their attention to assess the socio-economic potential of *Khejur* palm and to extend co-

operation to support related research activities for the purpose of adding a feather of success in the crown of the Palm Action Plan.

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